

Wastewater Treatment Plant Biosolids Composting Equipment

Green Project Justification

Business Case

This business case is intended to provide information regarding the cost effectiveness of composting biosolids versus burying biosolids in a landfill. A brief history of current operations related to the management of the City of Casper's Wastewater Treatment Plant (WWTP) biosolids is provided along with an outline of key decision criteria used to develop this business case.

Brief History Summary

The WWTP's sludge (biosolids) is transported and disposed in the Casper Regional Landfill, and WWTP pays the landfill tipping fee for disposal. The Wyoming Department of Environmental Quality (WDEQ) approved the Casper Regional Landfill to initiate construction of a biosolids storage & treatment area (Biosolids Composting Facility) at the southwest corner of the landfill permit boundary. The majority of construction is planned to be completed June 2012.

Casper Solid Waste staff plans to haul biosolids three times a week using a roll-off truck to the newly constructed Biosolids Composting Facility starting July 2012. WWTP staff will mix wood chips from yard waste into the biosolids three times a week creating biosolids windrows. The windrows need to be aerated and watered on a regular basis. Currently the solid waste staff uses a compost turner driven with the compost loader to aerate and water the compost windrows in the Solid Waste Facility compost yard. The turner is due for replacement and the solid waste & WWTP staff researched new turner technology that could be used for composting applications.

New self propelled turners allow a turner to aerate & water at the same time; thus saving fuel and labor hours. In addition, new self propelled turners will handle windrows 18 feet wide and 9 feet tall compared to the existing windrow sizes of 8 feet wide and 4 feet high – this will double the capacity at the Casper Regional Landfill Facility's compost yard. In addition the new self propelled turners require the distance between windrows to be the width of the turner tire, approximately 18 inches compared to the current turner that requires the width of a loader to pull the turner. This will also double the capacity of the compost yards. The existing compost yard and new Biosolids Compost Facility both could utilize the new turner technology. The cost of a new turner is approximately \$500,000. A cost benefit analysis follows:

Solid Waste will store and process biosolids from the WWTP at no charge. Processing the biosolids via composting will create a Class B or possibly a Class A biosolid compost that will be used for landfill cover and reclamation. This arrangement is beneficial to both the WWTP and Solid Waste and provides many advantages as described below.

BENEFITS AND COSTS TO PUBLIC UTILITIES WWTP FUND

The WWTP realizes operational cost savings for sludge transport (using diesel for the roll-off truck from the solid waste fueling station & solid waste labor) and disposal. The WWTP costs and savings associated for a twenty year period are:

COSTS

- Design, Construction, & Permitting of Biosolids Compost Area: \$350,000 which includes a compacted, impervious surface; storm water culverts; earthen berms; stormwater runoff retention ponds; treatment pad; and access and exit roads. This is being paid for by the WWTP Fund and is mainly being constructed in-house by City personnel and equipment.
- Rolloff Truck; \$75,000 (already purchased)
- Self-Propelled Windrow Turner; ~\$250,000 (needed, estimated 50% of cost)
- WWTP Labor to treat biosolids including mixing wood chips, aerating & turning, and assisting with hauling to storage area; using existing staff; \$0.00

SAVINGS

- Landfill Disposal: 60 tons per week @ \$25 per ton, which is \$1,500 per week for an annual cost of \$78,000. Twenty years would cost \$1,560,000. This does not include increases over the years due to community growth (more biosolids) and landfill tipping fee increases.*
- \$8 per round trip from WWTP to solid waste for fuel for six trips per week for a total of \$2,496 annual or \$49,920 for 20 years.
- The self propelled windrow turner will recycle Biosolids Composting Facility runoff water, when available, to provide moisture for the compost windrows during turning. Estimates of stormwater runoff from the Biosolids Composting Facility detention ponds will be negligible except during 100 year storm events.

TOTAL WWTP SAVINGS OVER 20 YEARS IS ~\$934,920 (\$46,746 per Year)

**** Annual savings with an average community growth of 1 percent and an average inflation value of 3 percent over a 20 year period would be \$85,738.***

In addition there are benefits to the City Solid Waste Balefill Fund as well.

BENEFITS AND COSTS TO SOLID WASTE BALEFILL FUND

The Balefill realizes operational cost savings for top soil and landfill air space. The Balefill costs and savings associated with the biosolids composting operations over a twenty year period are:

COSTS

- Labor for overseeing biosolids processing including mixing wood chips, windrowing, watering & turning, and transporting to storage area; and hauling biosolids. Use ½ FTE City Equipment Operator I staff position, \$31,200, and annual diesel fuel costs, ~\$2,496 per year or \$673,920 over 20 years.
- Self-Propelled Windrow Turner ~\$250,000 (needed, estimated 50% of cost)
- Recondition Self-Propelled Windrow Turner would cost approximately ~\$175,000 in 2011 dollars and in 15 years when a reconditioning is anticipated in a 20 year analysis, the cost would be

\$228,335 which includes an average 3% annual inflation factor.

SAVINGS

- No solid waste operation costs for top soil. Biosolids composting will eliminate the need for solid waste staff to purchase top soil for reclamation of landfill cells and vegetation of side slopes for stabilization. The current cost of top soil is \$3.50 per cubic yard, and ~129,066 cubic yards is needed every ten years for a total savings to the Balefill Fund of \$451,731 every 10 years and \$903,462 every 20 years.
- No solid waste capital investment for a needed backup roll-off truck; ~\$75,000.
- The life of the existing solid waste roll-off truck is extended five years with a replacement at 15 years instead of 10 years because we would have two roll-off trucks in the solid waste inventory for a 20 year analysis; ~\$2,500.
- Approximately 6,500 cubic yards of biosolids is generated per year. The cost per cubic yard of airspace is ~\$4.70 an annual savings of \$30,550; \$611,000 airspace savings over 20 years.
- Composting with a turner that aerates as it waters will insure aerobic composting conditions which reduces green house gases and generates carbon credits compared to an anaerobic static composting condition.
- No WWTP fees for treatment of stormwater runoff from the Biosolids Composting Facility stormwater detention ponds. These will be recycled into the watering system of the self propelled compost turner. Cost savings will be considered negligible due to estimates of zero to negligible accumulation of stormwater runoff from the Biosolids Composting Facility.
- Double the capacity of Transfer Station compost yard eliminating capital costs to expand the existing 8 acre compost yard. Cost savings unknown.

TOTAL BALEFILL SAVINGS OVER 20 YEARS IS ~\$493, 040 (\$24,652 per year)

***** *Annual savings with an average community growth of 1 percent and an average inflation value of 3 percent over a 20 year period would be \$47,432.*

IN SUMMARY

City staff believes purchase of a new self propelled windrow turner for the operation to compost biosolids will save energy (less GHGs) & save money. It will save energy because turning the biosolids windrows to add oxygen creates an aerobic condition for composting which reduces greenhouse gases, and, the turner will water the windrows at the same time eliminating the need for twice the labor.

An average annual savings of \$133,170 is estimated for the City of Casper and the payback period for capital and operation and maintenance costs is estimated as follows (assuming an annual average community growth of 1 percent and an average inflation factor or 3% over a 20 year period)

- 9 years for the WWTP Fund, and
- 4 years for the Balefill Fund.

City staff is confident from the existing data above; the Biosolids Composting Facility will save money for both the WWTP and the Balefill. And, it is believed the data above illustrates the long-term cost effectiveness of composting biosolids versus landfill and purchase of a new windrow turner that waters and aerates and the same time.